Pathways

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Verbal Problems in Primary and Middle School Mathematics

By **Jose Paul**

Teachers of Mathematics at the primary and middle school levels often complain that their students develop a mental block when faced with verbal problems. By verbal problems I mean here what are usually called "statement sums". Operations such as addition, subtraction, multiplication and division are the only ones really needed for use in the primary and middle school level. Sums such as these,

78	83	46	87÷21
+34	−47	×63	

will perhaps be worked out competently by the children, but when these are used in a statement sum, students get lost. And the paradox is that these operations have a meaning only when they are used in situations which can be stated verbally. Today electronic calculators have become routine household gadgets, which can easily perform these operations. However it is the human mind which selects which operation is to be carried out. Hence, though we should not minimize the drilling in these operations, we have an equal, if not greater responsibility, to train our pupils' minds to analyse and solve problems.

We will discuss the solution of verbal problems at three different levels: (A) the procedures involved in problem solving, (B) the causes of poor performance, and (C) methods of improving problem-solving abilities.

A. PROCEDURES INVOLVED IN SOLVING VERBAL PROBLEMS INCLUDE

i) **Reading of the problem** : The first step lies in understanding the problem itself. It must be read **very carefully** and analysed into its components.

ii) **Identifying what is given:** The reading and analysis of the problem must enable the child to pick out which facts are given in the problem.

iii) **Deciding what is asked:** Unless a child is able to identify exactly what is to be calculated, he will not be able to proceed further.

Let us take a simple example: The interest on a sum of money deposited by 3 friends together in a bank amounts to Rs. 125/- in 5 years at rate of 5% p. a. Find the sum deposited.

While reading the problem the child must absorb the information. He will ask himself questions like: What is Rs. 125/-? interest ? amount (principal + interest) ?

This must lead to clear identification of the given data. It must then be put down as

Interest = Rs. 125
time = 5 years
friends = 3
rate = 5%

Finally the child must decide what is to be found. Is the amount given ? What does the word "sum" mean—principal ? amount ? anythingelse ?

iv) **Deliberating on the relationship between what is given and what is asked and determining the operation required to be performed is the next the step.** This process is most crucial. The child needs to ask himself if the data given is relevant and adequate. He must also be able to identify irrelevant information which is not directly useful to him.

v) **Next, this verbal information must be converted (translated) into a number question i.e. into a mathematical open sentence.** Example: Into a box of apples when 25 more apples are added, the total is 55 apples. What was the number of apples in the box at the start ? This becomes.

$$\square + 25 = 55$$

vi) **Finding the answer :** This process simply entails performance of the necessary operation as indicated by the mathematical sentence.

vii) **Checking the answer :** This is an important aspect of problem solving. Often children hurriedly obtain a result and hope the answer will be the right one. It must be clear to them that mathematics is an exact subject and there is no place for hit and miss solutions. Checking the answer helps them become more independent and builds their self-confidence.

viii) **Interpreting the answer :** For a majority of children the answer is merely a number. The child must be able to explain what that number means. In primary classes this may only involve stating that the answer is not 50 but it is 50 students or 50 rupees or 50 apples, as the case may be.

B. THE CAUSES OF POOR PERFORMANCE IN VERBAL PROBLEMS COULD BE ONE OF THE FOLLOWING :

i) **It is possible that the teacher has over-emphasised computations or operations at the expense of problem solving.** Even before the child is able to formally read and write, plenty of simple verbal problems can be solved orally in the class. This familiarises students with numbers and the use of operations in problems.

ii) **The wording of many verbal problems found in books is not conducive to analytical thinking.**

Consider this problem : From 50 trees in a garden, 30 are cut down. How many are left ?

The above problem is direct and easy; one in which not much of analytical thinking comes into play. The same facts might have been presented differently, as follows :

In a garden, during a storm, 30 trees were destroyed. The farmer had planted five rows of ten trees each. How many survived the storm ?

Here the child has a little more to think about. He may even have to draw a diagram get to the facts. To decide what is given and what is to be found out he needs to analyse the problem a little more carefully. The child has to be led gradually to problems involving more complex thinking and analysis.

iii) **The pupil lacks the skills needed to read and interpret the word problem.** The language of the word problems must be within the grasp of the child. Most often the language used in the problems given in our textbooks is of far higher standard than that taught in the

—Contd. on page 12

Practical Chemistry In Your Classroom

To most middle school students, Chemistry is an abstract subject, with boring formulae to be memorised and unintelligible reactions to be remembered. With a little advance planning it is possible to provide the students with some practical experiences which will fascinate them and arouse their interest in the subject. Some of these are described below.

Changes in colour or the production of new susbtances are the most appealing With some thought, conventional equipment can be dispensed with and improvised, easily available substitutes used. The children can work in small groups in the classroom and record their findings in a pre-determined format, which the teacher has explained to them.

Experiment 1 : Use ice-cream cups instead of test-tubes and place a variety of common acids or alkalies in them Lime juice, vinegar, a solution made from vitamin C tablets (ascorbic acid), lime water (obtain the lime from your local *pan-wala*), a solution of soda bicarb and a solution of Milk of Magnesia or antacid tablets are some possibilities.

Test these solutions with the usual indicators-litmus (blue and red), and phenolphthalein. Provide each indicator in a labelled medicine bottle fitted with a dropper. Try unusual indicators like turmeric (as a powder or stirred in water), the juice of *jamun* or beetroot. Find out what other natural substances can act as indicators.

Experiment 2 : Allow the children to make Peanut Brittle. Heat moist sugar in a heavy metal pan over a low fire (a kerosene wick stove would be safest for students) until it melts and form a caramel coloured liquid. Add broken roasted peanuts to this liquid. A small pat of butter may be added it desired. The whole mass should be stirred quickly and turned out onto a greased plate and left to harden.

What type of a change was seen ? Discuss, in detail, the changes observed in the physical appearance of the sugar as it was heated. How does the final product differ from the substances we started with ?

Experiment 3 deals with exothermic and endothermic reactions, (you may or may not use these technical words). Supply each group with small bottles containing solid calcium chloride, solid ammonium nitrate, distilled water, a spatula and two test-tubes in a rack. Remind students that they should not touch any chemicals with their hands and must wash their hands well after any experiments.

Let them investigate what happens when a small amount of calcium chloride is dissolved in the distilled water. Shake the test-tube and then feel it **on the outside.** It is quite warm. Conversely when ammonium nitrate dissolves, it takes up heat from the surroundings, including the test-tube, which now feels colder. Note : this should be described carefully as loss of heat and not as production of "cold".

Experiment 4 illustrates the production of a precipitate as well as the action of light on some chemical substances. This should preferably be carried out in clear plastic ice-cream cups (not the opaque white ones). Use a plastic funnel and filter paper from the laboratory.

Pour about 50 ml of sodium chloride solution into the cup. Observe that it is clear and colourless. Add to it about 50 ml of silver nitrate solution. What change is observed ? Teach the groups of children how to fold the filter paper correctly and fit it into their funnels. Filter out the precipitate.

Open out the filter paper on a table and cover half the sample with a piece of cardboard to protect it from light. Expose it to bright sunlight for a few moments. Compare the two parts of the sample after this.

If facilities permit, similar experiments may be tried out with the other silver halides-silver bromide and silver iodide. Discuss the use of these halides in making photographic film.

Experiment 5 : Other interesting precipitation reactions which children could try out include :

i) copper sulphate + ammonium hydroxide

Warning : excess of hydroxide dissolves the precipitate

ii) lead nitrate + potassium iodide

iii) lime water + carbon dioxide

The lime water can be taken in a glass. Exhale or blow bubbles into it through a drinking straw. Here too, an excess of carbon dioxide causes the precipitate to disappear. To avoid disappointment, it would be a good idea to make fresh lime water and test it yourself before the class uses it.

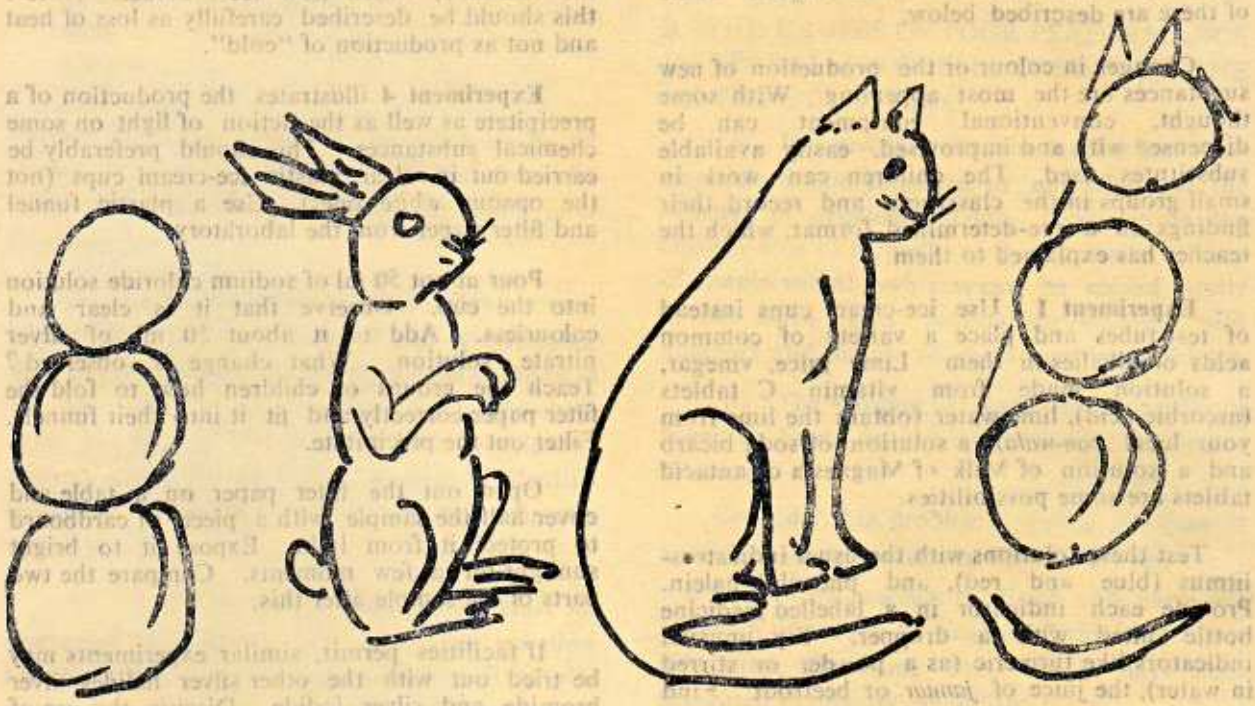
Precautions mentioned in experiment 3 should be maintained. This will be a useful training for laboratory work to be done in higher classes.

Gayatri Moorthy

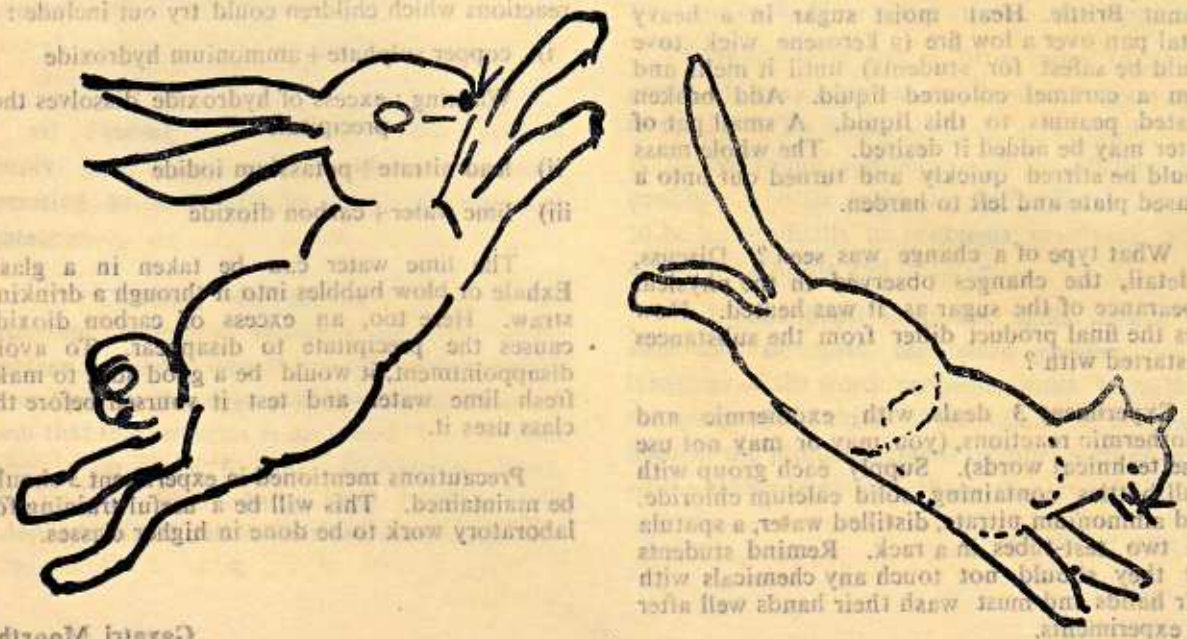
ANIMAL SHAPES

The shapes of most animals can be built up around combinations of simple geometrical figures like the oval and the circle. A slight twist here and there, a change in the position of the limbs, the addition of different appendages like tails and ears converts these geometrical shapes into animals.

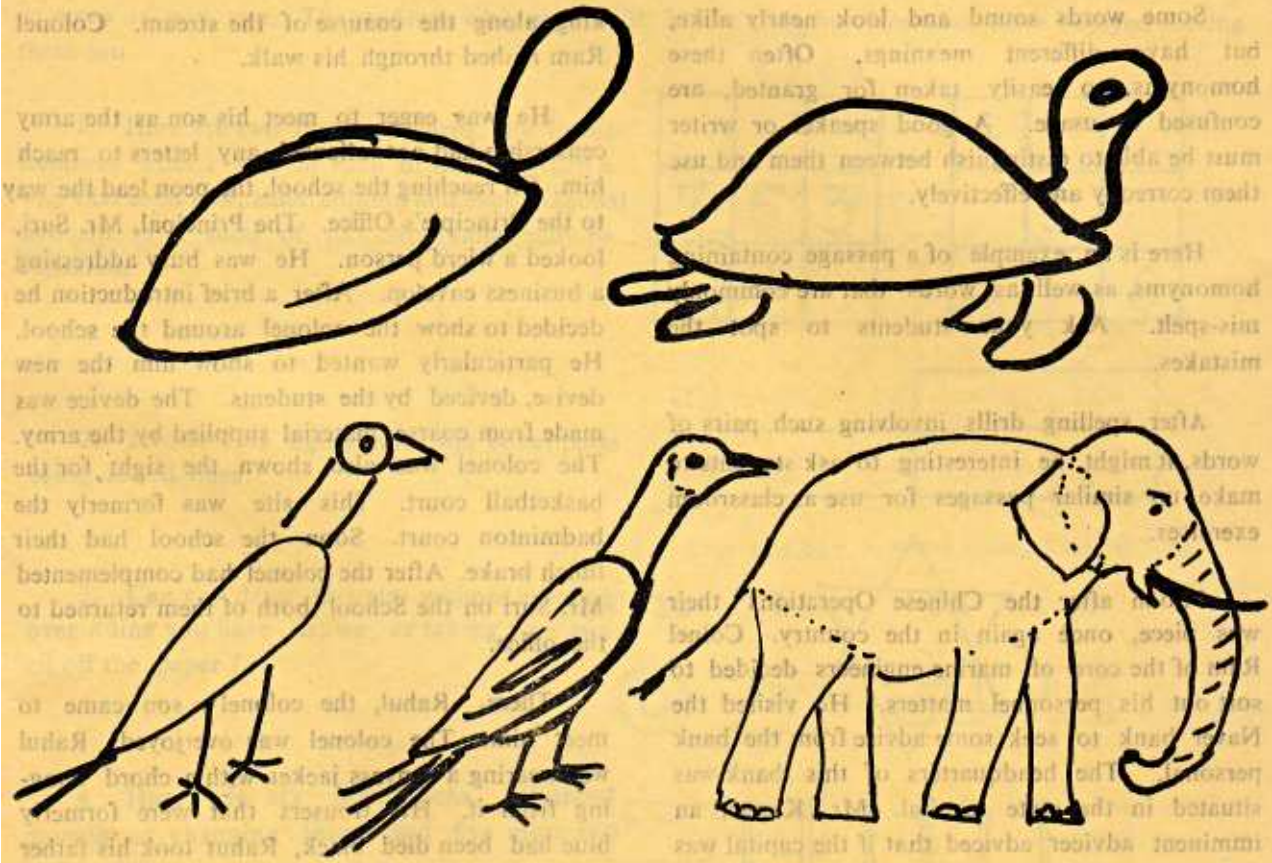
Observe, for example, how a set of three circles can change into either a rabbit or a cat !



And if you should change the slant of the circles the rabbit can leap into the air, or the cat can pounce on an unwary mouse.



The next figures show you a tortoise, a crow, and (of course) an elephant. With a little practice on your part you can change the poses of these animals. Perhaps your imagination will now help you draw other animals as well. Use them on your charts and to liven up story-telling sessions in the junior most classes.



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Spot The Error

Some words sound and look nearly alike, but have different meanings. Often these homonyms. so easily taken for granted, are confused in usage. A good speaker or writer must be able to distinguish between them and use them correctly and effectively.

Here is an example of a passage containing homonyms, as well as words that are commonly mis-spelt. Ask your students to spot the mistakes.

After spelling drills involving such pairs of words, it might be interesting to ask students to make up similar passages for use as classroom exercises.

"Soon after the Chinese Operations their was piece, once again in the country. Colnel Ram of the core of marine engineers decided to sort out his personnel matters. He visited the Navel bank to seek some advise from the bank personal. The headquarters of this bank was situated in the state capital. Mr. Kapur, an imminent advicer adviced that if the capital was in the name of his son, who was still a miner, the colonel would gain more interest. Mr. Kapur farther added that if the amount of money acceded Rs. 20,000 Colonel Ram would loose money. The Colonel, though he differed from Mr. Kapur agreed to do as he was instructed.

After the work at the bank was over, the Colonel decided to take a walk threw the woods to his sons school. In the woods he saw some fouls walking along the coaurse of the stream. Colonel Ram rushed through his walk.

He was eager to meet his son as the army censership had not allowed any letters to reach him. On reaching the school, the peon lead the way to the Principle's Office. The Principal, Mr. Suri, looked a wierd person. He was busy addressing a business envelop. After a brief introduction he decided to show the colonel around the school. He particularly wanted to show him the new devise, deviced by the students. The device was made from coarse material supplied by the army. The colonel was also shown the sight for the basketball court. This site was formerly the badminton court. Soon the school had their lunch brake. After the colonel had complemented Mr. Suri on the School both of them returned to the office.

There, Rahul, the colonel's son came to meet him. The colonel was overjoyed. Rahul was wearing a canvass jacket with a chord hanging from it. His trousers that were formerly blue had been died black, Rahut took his father to introduce him to all his teachers accept the councillor, who was away on leave. Colonel Ram realized the affect of the school and its environment on Rahul. They had brought about a tremendous change in him. He was glad to see his son's progress. The meeting over, Colonel Ram returned to his office, well satisfied wlth his visit."

Arti Laroia
Sardar Patel Vidyalaya, New Delhi

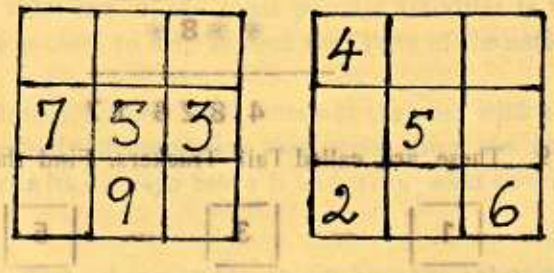
Nature is shy and you cannot approach it in a crowd. It is best absorbed, when not taught. Walk in the wilderness with one little friend as your equal not changing, not educating, or damaging and discover for yourself what nature is

—Sidhartha C. Buch
from an article in The Hindu.

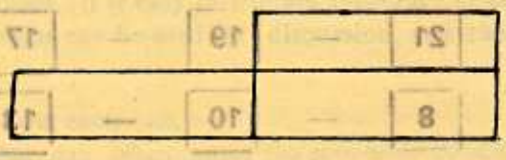
FUN WITH MATHS

Often Maths is tricky but it can bring you a lot of fun. Enjoy it and share some of it with your pupils, family and friends, It doesn't matter if you can't answer all these questions—do as many as you can, The students who use the St. Xavier's Maths Workshop have enjoyed solving them too.

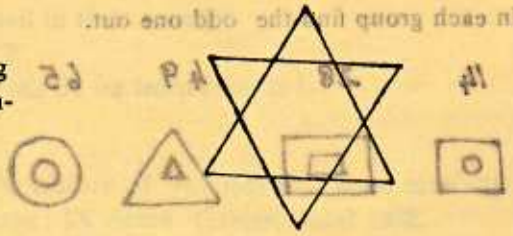
1. Here are two magic squares. Fit in the numbers from 1 to 9 in each of them, in such a way that each row, each column and each diagonal add up to a total of 15. No number may be repeated.



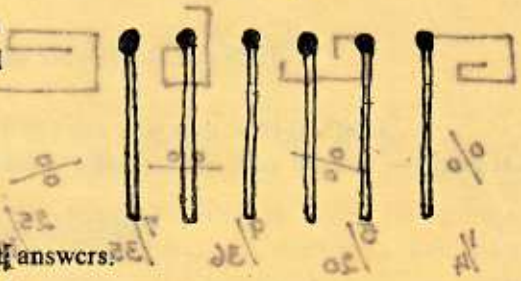
2. Divide this figure into four equal parts using dotted lines.



3. Can you draw this star without crossing over a line you have drawn, or taking your pencil off the paper ?



4 Here are six matchsticks. Without moving or changing them, add five more and make nine.



5. Fill in the right sign to get the correct answers.

4	5	7	3	=	13
4	3	7		=	49
6	7	11	5	=	29
1	4	4		=	8

6. Correct this equation by moving only one line from one place to another.

VI + II = V

7. This is called Number Weaving. Fill in the blanks

37	×	3	=	111
37	×	6	=	222
37	×	9	=	333
37	×	12	=	
37	×		=	555
37	×		=	

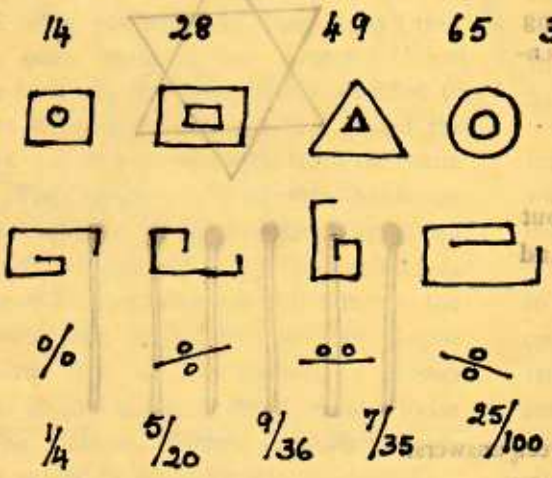
8. Fill in this missing digits to complete this multiplication.

```
  ❀87
X ❀❀1
------
  4❀❀
 43❀3
 ❀❀8❀
-------
 48261 7
```

9. These are called Tail Trackers. Find the rule which is followed here and complete each line.

1	—	3	—	5	—	7	—	—	—
21	—	19	—	17	—	15	—	—	—
8	—	10	—	13	—	17	—	—	—

10. In each group find the odd one out.



Mrs. Pearl Scott
St. Xavier's School, Delhi

The Boss And The Leader

* The boss says "I". The leader uses "we".
* The boss creates fear. The leader inspires trust.
* The boss "knows how". The leader "shows how".
* The boss orders. The leader asks.
* The boss relies on his authority to get things done. The leader relies on co-operation to get things done.
* The boss provokes resentment. The leader fires enthusiasm.

HISTORY THROUGH COINS

Whatever the subject, children learn best when their lessons involve some activity.

While teaching sources of History I have found that one of the most popular activities is making coin rubbings and using the messages on the coins as clues to help analyse the state of the nation.

First we gather the coins in current use, of all denominations. We sort out the ones with inscriptions and 'pictures'. We read the messages and verbally discuss what they reveal about the Nation's concerns. Then we take rubbings of each coin, write its message below it and write what conclusions we have drawn from the message.

Once we have used coins and their messages as clues, it is easy to explain how ancient coins have provided evidence of the past. Pictures of ancient coins can be used for discussion and the students can try to draw their own conclusions.

Here are some questions that should be answered about each coin :-

* What metal is the coin made of ? (One can often guess the economic conditions of a coun try from the type of metal used in their coins)
* In what year was the coin struck ?
* What does the message say and what do we learn from it ?
* What does the 'picture' show ?

A collection of Indian coins can reveal India's history if you interpret them carefully. Let us, for example, study the 10 paise coin with the message : IX Asian Games, Delhi 1982.

It is analysed in this way :-

i. Coin A shows the Emblem of the Asiad Games held in Delhi.
ii. The Games were held in 1982.
iii. Asia has held 8 such games before and the 9th one was held in Delhi.
iv. The emblem shows a historical monument called the 'Jantar Mantar'—which is an observatory built during the Mughal times.
v. India uses 2 major languages, Hindi and English.

One can conclude that in 1982, Delhi was a flourishing capital of India, capable of hosting an inter-Asian Games meet.

In this way coins showing National Integration, development of Fisheries, advancement of Rural Women and Children as the Nation's Pride can be examined, and discussed. A Picture of India's current problems and the Government's plans to tackle them, emerge from a study of the coins. This whole exercise can be done with stamps too, as stamps also carry messages and clues.

HOW TO MAKE A RUBBING : Place the coin under a piece of paper and rub gently with a soft pencil. The paper should not be too thin, as the pencil may tear it.

UMA AHMAD

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—*Contd. from page 2*

language class. Therefore it is not possible for the child to comprehend the problem itself. Thus, teachers haxe to be very careful in preparing and selecting problems suitable to the language level of the child.

Very often teachers use a language at their own level of understanding. In the problem on interest given earlier, the word 'amounts' could be interpreted as "principal + interest" or as a verb meaning " becomes". The child may not be able to distinguish which meaning fits the problem. Here is another simple example : A teacher says "Do this sum In a bag there are 70 mangoes. 30 are rotten. How many good mangoes are there ?"

The child's solution may be :

Mangoes in the bag :	70
rotten mangoes	30
sum	100

When a child solves the problem like this, he/she has understood the word 'sum' as meaning addition. How can 'sum' be thought of as subtraction ?

iv) **The time allotted to solve verbal problems is sometimes insufficient.** We have seen that in solving verbal problems, there are various steps involved. In looking for a solution, the child needs time to think, analyse, find relationships. work out the number equation, check and interpret the result. Different children take varying amounts of time to go through this mental process. A teacher concerned about finishing the syllabus may be tempted to go on solving more and more problems without giving the students time to think.

v) **The child may not be conversant with the necessary mathematical vocabulary needed to solve the word problem :** e. g. A number is twice as much as 20. A number is twice as much more than 30.

Phrases and statements like these are quite difficult for the child. If he is not able to understand the mathematical vocabulary, his solution of the problems is bound to go astray.

vi) **The student is not proficient in estimating answers.** If the student is trained to estimate the approximate answer before he actually works out the problem, it will help him to detect any mistakes made in the working out of a problem. For example: 31 times 4. The child will immediately estimate $30 \times 4 = 120$ and hence he will expect the answer to be a little more than 120. If he gets answers like 84 or 154 he will reject them, re-work the computation and avoid mistakes.

vii) **The student cannot perform simple computations mentally.** This could be one of the reasons for slow performance in problem solving.

viii) **The pupil may not have been adequately drilled in a particular operation.**

ix) **The situations presented in word problems may not appeal to the age level of students for whom they are intended.** Most textbooks lack life-related problems. They take the child out of his environment, ask him to imagine himself in unfamiliar surroundings in which the problem is set.

One common example is available in problems involving large numbers of sacks of grain stacked in a godown or warehouse.

x) **The classroom climate may not be conducive to a proper learning situation.** When the classroom climate is tense, where the teacher is authoritative, where the teacher's expectations of achievement are above the level of achievement of the students, where there is tremendous competition between classmates etc., a peaceful atmosphere conducive to good learning does not exist.

C. TECHNIQUES FOR IMPROVING PROBLEM SOLVING CAPABILITIES

i) **Help the children to analyse the problem so as to be able to identify the given data and the objective or goal of the problem.** With this the child is already halfway towards a solution. The teacher can help the child by

asking a lot of questions on the problem. This should train the child to ask himself similar questions.

ii) **The Method of Analogy:** When a child finds it difficult to observe the relationships between the data and the goal, the teacher may use simple analogies which give the child an insight into the relationship. As far as possible allow the child to discover the relationship himself. The teacher must only give clues. He or she should prevent himself / herself from giving away the actual relationship.

e.g. 5172 people came to buy tickets for a movie The hall can seat 1800 people. 700 people bought tickets at Rs. 7.50, 800 bought tickets at Rs. 5/-. The remaining tickets cost Rs. 3.50 each. How many people could not get tickets ?How much money was obained by the sale of the tickets ?

Even though to us adults, this appears a simple problem, for a child it may turn out to be difficult. We can help the child to analyse the problem and find relationships between the given data and goals by giving a simpler example such as this : Twenty students went to buy icecream. The icecream vendor had only 10 icecreams. 2 of them bought choco-bars at Rs. 3/- each and 5 of them bought vanilla cups at Rs. 2/- each. The remaining orange sticks were sold at Rs. 1 /- each How many students bought orange sticks ? How many did not get icecream ? How will you find the total money spent ?

An analogy like this helps the child to see the relationship between the big numbers which looked so frightening at first. I would like to give one more example of an analogy.

A boy is half as old as his father. In 10 years time the boy will be $\frac{5}{8}$ the age of his father.Find their ages.

If a child finds the problem difficult, the teacher can give a similar problem, such as :

A boy is 20 years old. He is half as old as his father. In 10 years time, the boy will be $\frac{3}{5}$ age of his father.

What is the age of the boy ? (20 years)
What is the age of the father? (2×20 years)
10 years later what is the age of the boy ? ($20 + 10$ years)
10 years later what is the age of the father ? ($20 + 10$ years)

$$\frac{(20+10)}{(2\times 20+10)} = \frac{30}{50} = \frac{3}{5}$$

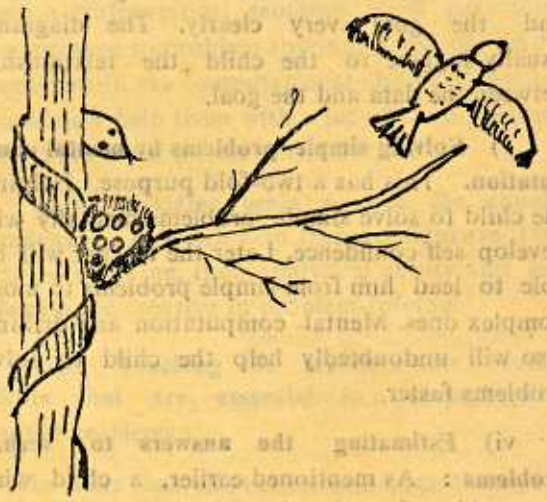
Now go back to the original problem

What is the age of the boy ? Unknown, hence $\times$ years
What is the age of the father ? $2X$ years
10 years later age of the boy = $2X + 10$ years
10 year letter age of the father $2x + 10$ years

Hence $$\frac{X+10}{2X+10} = \frac{5}{8}$$

Simple analogies are an excellent way of helping children improve their problem solving.

iii) **Devising problems by interpreting given pictures :**



Devise a problem from this picture.

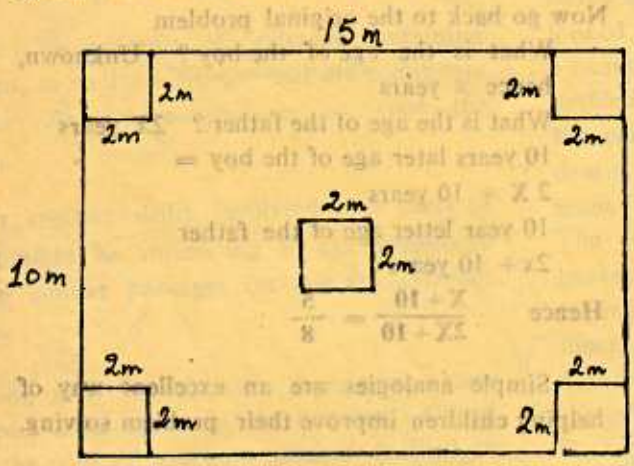
A bird laid some eggs. When it went in search of food, a snake ate up some eggs. How many eggs were laid by the bird? How many

were eaten up by the snake ? How many eggs are safe up to now ?

This kind of story composed with the help of the children will help them imagine the situations in word problems.

iv) **Solving verbal problems with the help of pictorial representations.**

Eg. In a rectangular garden 15 m x 10 m, 5 square patches of flower beds 2 m x 2 m are there. The remaining area is to be made into a lawn. What is the area of lawn ?



Once the child is able to represent the problem in the form of a diagram, he can visualise and understand the given data and the goal very clearly. The diagrams usually suggest to the child the relationship between the data and the goal.

v) **Solving simple problems by mental computation.** This has a two-fold purpose. Helping the child to solve simple problems mentally will develop self-confidence. Later the teacher will be able to lead him from simple problems to more complex ones. Mental computation and drilling also will undoubtedly help the child to solve problems faster.

vi) **Estimatiug the answers to verbal problems :** As mentioned earlier, a child who is capable of estimating the answer before actually working out a problem, will avoid many errors in computation. e.g. The cost of 5 books is Rs. 10 50. What is the cost of 18 books ? The child will estimate the cost of one book as about Rs. 2/- and therefore the cost of 18 books will be somewhere near Rs. 36/-. He will re-check any widely different answer that he arrives at.

vii) **Formulating situations and problems to fit given mathematical open sentenees.**

This approach helps the child to understand and internalise the relationship between the data and the solutions. For exampie

$$2(7+3) = 20$$

The child is asked to formulate a situation in which this mathematical sentence is meaningful. It could be : a bouquet of flowers contains 7 marigolds and 3 roses. Two such bouquets will contain 20 flowers.

viii) **Identifying superfluous data in a word problem :** In most word problems all the data that is given is to be used to find the solution. Hence children are usually convinced that all information given is essential and must be used somehow. Any extra or irrelevant data that is present in the problem, gets them confused. They either stop working at the stage of finding relationships, use all the data and arrive at a wrong solution, or use a long and cumbrous process to obtain the answer

In real-life situations, invariably, irrelevant data will come into play. Hence it is essential to train young minds to analyse problems and to sieve out the relevant material.

e. g. During the school admission time for class I, 600 applications reached the Principal. Out of 170 seats available, 43 are admitted in class I A, 45 are admitted in class I B and 40 in class I C and the rest in class I D. How many students did not get admission in the schools ?

Given data
Total applicants = 600
Seats in schools = 170
Students in class I A = 43
Students in class I B = 45
Students in class I C = 40
Students in class I D = ?

To find out the number of students who did not

get admission the child needs only the first two items of the data. The child may however use all the data and come to the correct solution in a roundabout way wasting a lot of time.

Yet another example: There are 3 sections of class IX in a school. Each class has 40 students. Each student has to pay a monthly tuition fee of Rs. 70 /-. What is the yearly fee collection from each section of class IX ?

There is irrelevant data concerning 3 sections and there is a hidden goal - **yearly fee.** The student must be helped to perceive these.

ix) **Identify the kind of additional data needed :** When all the data needed to solve a problem is available there is little to stimulate thinking. It is a good idea to pose some problems which cannot be solved due to lack of sufficient data. The student may be asked to supply the missing items. This process of identifying the missing data helps the child to visualise clearly the relationship between the data and the goals.

e.g. : The distance between two towns A and B is 600 km. A car starts from A and travels toward B at an average speed of 60 km. p. h. Another car starts from B at the same time and moves from B to A. After how much time will they cross each other ?

This problem cannot be solved unless the speed of the second car is given. This item is missing in the given data. There is no solution for this problem unless the child supplies this data.

x) **Working with problems which have no numbers.** This is a good mental exercise for children. It helps them to identify and internalise which operation is to be used and when. Since there are no numbers, there is no fear of going wrong in the computation. However it helps them to relate the data and understand which computations are to be carried out. This develops a clear and logical thinking process.
Example : A group of people can complete a construction in a certain number of days. If a smaller group of people work on the same job, how long will they take ? If a bigger number of people do the same work, how long will they take ? Ask : what are the stages leading to a solution ? What operations are needed ? Why ? If necessary let students supply the numbers and work out the problem.

In the lower classes it is essential to have this type of problem in order to understand the meaning and purpose of different operations.

e.g. There are a certain number of apples in a basket. There are many baskets like that. What is the total number of apples ? .
What will you do ? add ? why ?
add what ? baskets + apples ?
apples + apples + apples + ... why ?
divide ? why ?
baskets + apples ?
apples + baskets ?
or multiply ? why ?
baskets × apples ?
apples × apples × apples ... ?

xi) **Translating given problems into mathematical sentences :** Usually children are given enough exercise in computation. Hence helping students in the process of translating a problem into a mathematical sentence is of paramount importance to problem solving. A teacher who is confident in the computational ability of the class could now help them with a lot of word problems and train them in this particular skill.

xii) **Providing brain teasers for capable students :** This will help them to improve their logical thinking, their analytical ability and lead them to be creative in problem-solving.

xiii. **Teaching the students the reading skills that are essential in comprehending verbal problems :**
Make sure that all the necessary mathematical vocabulary for each topic is correctly understood by the student, e.g. amount, principal, interest, simple interest, compound interest, time (years, months, day) annually, semi-annually, quarterly, percentage are all mathematical vocabulary

connected with the teaching of INTEREST.

At the end of this article the main points are summarised to provide you with a ready check list which you can use in your work.

A teacher who remains aware of systematic problem - solving procedures and consciously helps the children through these stages not only helps them gain proficiency in mathematics but also builds in them the techniques and confidence to solve real-life problems An alert teacher will promptly locate cases of poor performance in the class, try to recognise the particular cause and take appropriate remedial measures.

When students are able to solve problems systematically and successfully, they also solve a big problem for you, the teacher !

CHECK LIST

A. Procedure for Solving Multistep Verbal Problems

i. Reading the problem.
ii. Identifying what is given
iii. Deciding what is asked.
iv. Deliberating, if necessary, with the help of diagrams, in order to find relationship between what is given and what is asked and to determine which operations must be performed.
v. Writing the number question—the 'open mathematical sentence.'
vi. Finding the answer
vii. Checking the answer
vii. Interpreting the answer

B. Causes of Poor Performance

i. The teacher overemphasises computation at the expense of problem solving.
ii. The wording of the verbal problems in textbooks does not encourage analytical thinking.
iii. The pupil lacks the skills needed to read and interpret the word problem.
iv. The time allotted for the child to solve a verbal problem is insufficient.
v. The pupil lacks knowledge of mathematical vocabulary.
vi. The pupil is not proficient in estimating answers.
vii. The pupil cannot perform simple computations mentally.
viii, The pupil lacks drilling and hence the ability to perform the required computations.
ix. The situations presented in the word problems are not appealing to the age level for which they are intended.
x. The classroom climate is not conducive to proper learning.

C. Techniques for Improving Problem Solving

i. Applying the method of analysis
ii. Applying the method of analogy (giving alternate simple mental problems)
iii. Devising problems by interpreting pictures
iv. Solving verbal problems with the help of visual representations
v. Solving simple problems by mental computations
vi. Estimating answers to verbal problems
vii. Devising verbal problems to fit given mathematical sentences
viii. Identifying superfluous data in given problems
ix. Identifying the additional data needed
x. Working with problems which have no numbers
xi. Translate the given problem situation into a mathematical sentence
xii. Providing brain-teasers for capable students
xiii. Teaching reading skills that are essential in solving of verbal problems

□

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